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AUTHOR Stone, Charlotte V.; And Others
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ABSTRACT

The paper reports on a study of Braille learning in which subjects (N=96) were provided with information about the structure of the Braille alphabet and expressly instructed to use that information during learning. A previous experiment had found that merely providing subjects with information about Braille alphabet structure had no effect on learning. Results of this experiment replicated the previous findings in that subjects in both informed and uninformed groups who reported using the information about structure performed no better than those who did not report using such information. There were some effects on learning of order of item presentation and arrangement of items. (DB)

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# Learning Braille: Effects of Information About Structure, Symbol Arrangement, and Test Rate

Charlotte V. Stone, Slater E. Newman, Randall A. Craig and Thomas S. Brugler

North Carolina State University

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Although the braille system has been in existence for over 150 years, there is very little information about how braille is learned (Foulke, 1982; Loomis & Lederman, 1986; Lorimer, 1982). This is especially the case for the learning of braille by those exposed to it for the first time.

The experiment reported here was done to determine the effect on learning braille of providing information about the structure of the braille alphabet (see Figure 1). The effects of symbol arrangement and of test rate on both learning of the symbol-name and the name-symbol pairs were also investigated. In addition, the effect of order of item presentation during the name-symbol test was examined. It was expected that recall would be facilitated if the order of the items on the test matched the arrangement of the items during the study period (Tulving, 1983; Tulving and Thomson, 1983).

In a previous experiment (Stone & Newman, 1987, November), providing subjects with information about the structure of the braille alphabet was found to have no effect on the amount learned. In the present experiment, however, subjects were expressly instructed to use that information during learning and subsequent retrieval, whereas subjects were not so instructed in our previous experiment. It was our expectation that if subjects were to use the information about the braille alphabet that they had been provided, learning would be enhanced.

## Method

All subjects (N=96) were given 8 minutes to study the 26 symbols of the braille alphabet and were then tested for recall. A 2 x 2 x 2 between-subjects design was used in which the independent variables were information (subjects were either provided or not provided with information about the structure of the braille alphabet prior to the study period), symbol arrangement (the letters were arranged horizontally from A-Z in the 10-10-6 arrangement shown in Figure 1, or they were arranged vertically in that 10-10-6 arrangement), and test rate (on the test, the items were presented at a 5-second rate or a 10-second rate). All items were presented visually during the study period and on the tests. Subjects in the information condition were instructed to use that information during learning and on the test that followed. On the first test, each symbol was presented and the subject was to respond with its letter name. Immediately following this test, all subjects were tested again at a 10-second rate. On this test subjects were presented with each letter and asked to

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respond with its dot-numbers (see Figure 2). For half the subjects in each treatment, the letters were presented in one of two random orders; for the remaining subjects the letters were presented alphabetically. Following this test subjects were asked how they had tried to learn the alphabet and to retrieve the items on each of the tests, and they were then dismissed.

The subjects (N=96) were undergraduates from the introductory psychology courses at North Carolina State University. They were assigned to treatments through use of a counterbalancing procedure. All were run individually.

## Results and Discussion

Test 1. The means for correct responses are presented in Table 1. A 2 x 2 x 2 between subjects analysis of variance indicated that only the effect of test rate was significant ($p < .01$). As would be expected, performance was better for those tested at a 10-second rate.

Test 2. The means for correct responses are presented in Table 2. A 2 x 2 x 2 x 2 mixed analysis of variance was applied to these data. Two effects were significant, test order ($p < .001$) and the interaction of test order and symbol arrangement ($p < .01$). Performance was better when the items on the test were presented alphabetically, particularly for those for whom the symbols had been arranged horizontally during the study period.

Post-Test Questions. In the informed group 75% of the subjects referred to the structure of the alphabet in answering questions about learning and retrieval, whereas only 19% of the noninformed group made such reference. In neither group, however, did those who made reference to structure perform significantly better on either test than those who did not refer to structure ($p > .05$).

The results of this experiment replicate those of our previous experiment (Stone & Newman, 1987, November) in that informing subjects about the structure of the braille alphabet did not facilitate learning. The present results are even more definitive regarding the effects of such information since in the present experiment subjects were explicitly encouraged to use the information during encoding and retrieval (and most reported that they did), whereas no such encouragement was provided subjects in the previous experiment. However, subjects in both the informed and the uninformed groups who reported using the information about structure performed no better than those who did not report using such information. Thus, it appears that providing subjects with information about the structure of the braille alphabet does not facilitate learning.

Performance was better on Test 2 when the order of the items was alphabetical (as it had been during study) than when the items were randomly ordered. Although the alphabetical mean was higher than the random mean in all eight comparisons, the effect was greater when the items were arranged horizontally during the study trial than when they were arranged vertically. The better performance when the order of the items matched the order during study appears to accord with a prediction derivable from the encoding specificity principle (Tulving, 1983; Tulving & Thomson,

1973). It is not clear, however, whether the prediction would be supported if the order of the items had been random during the study trial and the same (as compared with a different) random order had been used during the test trials. It may be that facilitation will be obtained only when the order which remains the same on test trials as on the study trial is (as was the case with the alphabetical order in this experiment) one which is very well learned.

Authors' Note

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Table 1

Mean Correct Responses on the Symbol-Name Test

| Orientation: | Horizontal | | Vertical | |
|---|---|---|---|---|
| Response Time: | 5 sec. | 10 sec. | 5 sec. | 10 sec. |
| Information | | | | |
| Not Informed | 12.08 | 14.33 | 11.50 | 15.00 |
| Informed | 9.25 | 13.58 | 11.17 | 15.25 |

Table 2

Mean Correct Responses on the Name-Symbol Test

| Orientation: | Horizontal | | | | Vertical | | | |
|---|---|---|---|---|---|---|---|---|
| Response Time: | 5 sec. | | 10 sec. | | 5 sec. | | 10 sec. | |
| Order of Test: | Random | Alphabet | Random | Alphabet | Random | Alphabet | Random | Alphabet |
| Information | | | | | | | | |
| Not Informed | 11.17 | 18.83 | 9.83 | 18.50 | 11.67 | 14.00 | 13.33 | 13.83 |
| Informed | 9.17 | 18.00 | 13.83 | 18.50 | 15.00 | 17.67 | 14.83 | 16.33 |

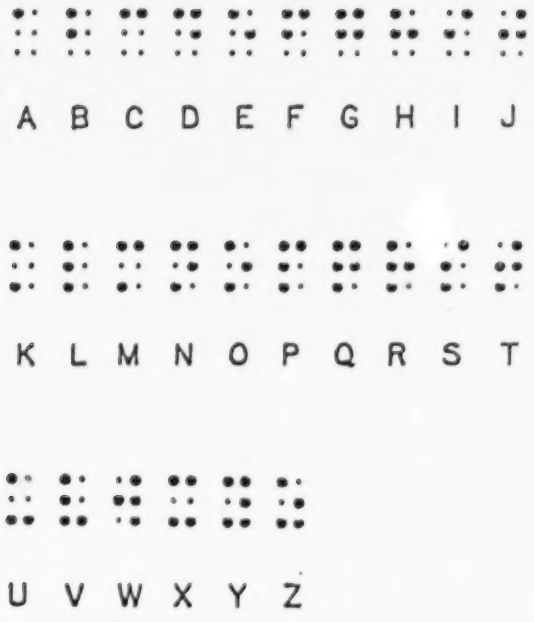


Figure 1. The twenty-six letters of the alphabet in braille symbols.

(Note that the symbols for K-T can be formed from the symbols A-J by adding the bottom left dot, and that the symbols for U, V, X, Y and Z can be formed from the letters K-O by adding the bottom right dot).

Figure 2. The braille cell and its dot-composition numbers.